

**Claims:** What I claim as my invention is:

5           1. An integrated process performing fermentation of low  
value (molasses) and waste sugars together with the conversion of  
biomass residues from the cane sugar industry (bagasse) for the  
production of multiple useful products. Such process combines the  
elements of alcohol-based organosolv pulping and ethanol  
10 fermentation into a single integrated process.

          2. A process, as in claim 1, in which the useful products  
are any combination, or number, of products including unbleached  
papermaking pulp, bleached papermaking pulp, high alpha-cellulose  
15 pulp, organosolv lignin, furfural, acetic acid, ethyl acetate, sodium  
acetate, xylose, xylan, butanol, acetone, high-protein animal feed,  
plant fertilizer, uronic acids and ethanol.

          3. A process for delignifying biomass fibrous residues  
20 comprising, digesting biomass fibrous residues in a mixture of ethanol  
and water in a digester at elevated temperature and pressure,  
continually exposing the mixture of ethanol and water to the fibrous  
residues in a suitable digester, or by circulating the mixture of ethanol  
and water between the digester and a holding tank for a time  
25 sufficient to at least partially delignify the biomass fibrous residues  
and form a pulp, draining the mixture to a spent liquor tank at the end  
of the circulation time, causing the remaining liquor and partially  
delignified biomass to transfer from the digester to a blow tank by  
opening the valve to the blow tank.

30           4. A process according to claim 3, wherein the process  
includes the step of recovering lignin and other chemicals from the  
mixture of ethanol and water contained in the spent liquor tank.

          5. A process according to claim 3 or claim 4, wherein the  
mixture of ethanol and water in the digester is maintained at a  
35 temperature in a range from 170 to 205°C.

          6. A process according to claim 5, wherein the pressure in  
the digester and the holding tank is maintained at a level sufficient to  
prevent the mixture of water and ethanol from vaporizing.

7. A process according to any one of claims 3 to 6, wherein the mixture of ethanol and water in the digester contains ethanol and water in a ratio in a range from 35% to 70% by weight ethanol to water.

5 8. A process according to any one of claims 3 to 7, wherein the circulation time lies in a range from 30 minutes to 3 hours.

9. A process according to claim 8, wherein the circulation time lies in a range from 1 to 2 hours.

10 10. A process according to any one of claims 3 to 9, wherein the process includes transferring the contents of the spent liquor tank to a flash tank to enable volatile material to evaporate thereby leaving a lignin-rich condensed liquor, lowering the pH of the condensed liquor to a level below 3, diluting the condensed liquor with an aqueous stream and cooling the condensed liquor to cause  
15 lignin to precipitate from the mother liquor and separating lignin from the mother liquor.

11. A process according to claim 10, wherein the process includes the steps of distilling the diluted mother liquor to recover ethanol and furfural therefrom leaving an aqueous stillage.  
20

12. A process according to claim 11, including the steps of concentrating the aqueous stillage by evaporation, allowing a liquid lignin fraction to settle, removing the liquid lignin fraction from an upper layer of the aqueous stillage thereby leaving an aqueous layer  
25 containing xylose, xylan and other sugars.